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Patient-centered attitudes among medical students in Mali, West Africa: a cross-sectional study

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**Patient-centered attitudes among medical students in Mali, West Africa:
a cross-sectional study**

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ABSTRACT

Background/objective: Patient-centered attitudes decline during U.S. medical training, yet little is known about attitudes among West African medical students. We sought to measure student attitudes toward patient-centeredness and examine validity of the 18-item Patient-Practitioner Orientation Scale (PPOS) in this context.

Participants/setting: 430 medical students in years 1, 3, 5 and 6 of the 6-year medical training program in Bamako, Mali.

Design: We conducted a cross-sectional survey and compared the proportion of students who agreed with each PPOS item by gender and academic year and calculated composite PPOS scores. To examine psychometrics of the PPOS and its two subscales ("sharing" and "caring"), we calculated internal consistency (Cronbach's alpha) and performed confirmatory and exploratory factor analyses (CFA and EFA).

Results: In seven of the nine "sharing" items, the majority of students held attitudes favoring a provider-dominant style. For five of the nine "caring" items, the majority of student responded consistently with patient-centered attitudes, while in the other four, responses indicated a disease-centered orientation. In eight items, a greater proportion of 5th/6th year students held patient-centered attitudes as compared to 1st year students; there were few gender differences. Average PPOS scores indicated students were moderately patient-centered, with more favorable attitudes toward the "caring" aspect than "sharing". Internal consistency of the PPOS was inadequate for the full scale ($\alpha=0.58$) and sub-scales ("sharing" $\alpha=0.37$; "caring" $\alpha=0.48$). CFA did not support the original PPOS factors and EFA did not identify an improved structure.

Conclusions: West African medical students training in Bamako are moderately patient-centered and do not show the same declines in patient-centered attitudes in higher academic years as seen in

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other settings. Medical students may benefit from training in shared power skills and in attending to patient lifestyle factors. Locally-validated tools are needed to guide West African medical schools in fostering patient-centeredness among students.

For peer review only

STRENGTHS AND LIMITATIONS

- First study to measure patient-centered attitudes among medical students in West Africa and compare attitudes among gender and academic year.
- First study to examine psychometric properties of the widely-used Patient-Practitioner Orientation Scale in West Africa.
- Cross-sectional design limits ability to attribute differences between academic years to an effect of time in medical training.

INTRODUCTION

Medical schools are increasingly adopting curricula to promote patient-centeredness, or a practice orientation that “consciously adopts the patient’s perspective” by valuing the patient’s experience, acknowledging the psychosocial aspects of illness, and offering the patient an equal role in decision-making [1]. These curricula have been developed in response to mounting evidence of the positive effects of patient-centeredness, such as higher patient satisfaction, increased efficiency of diagnosis and referrals, better patient adherence to medication and behavioral regimens and fewer missed appointments [2–5]. These curricula also represent an attempt to counter the decline of patient-centered attitudes during the course of medical education observed in longitudinal studies in the United States and Greece and inferred from a number of cross-sectional studies internationally [6–10]. Reductions in patient-centered attitudes may result from the heavy emphasis medical programs place on the biological aspects of disease, as well as the emotional burn-out medical students may develop as their responsibilities and work load intensify [11].

Despite increasing commitment to patient-centered training in high-income countries, few medical schools in sub-Saharan Africa have implemented formal curricula to promote a patient-centered orientation or teach patient-centered communication skills [12,13]. Some studies from the region suggest that while patients do generally prefer a patient-centered style of practice, providers tend to be more “provider-dominant” or “disease-centered” in their practice orientation [14,15]. Expanding patient-centered practice in the region could have a broad positive impact, as research from Africa has revealed its association with better adherence to family planning methods [16] and greater patient engagement in HIV care [17]. Further, as the burden of chronic conditions in sub-Saharan Africa increases, effective patient-provider relationships that can support long-term adherence and retention in care become even more critical [18,19].

Little is known about levels or patterns of patient-centered attitudes among medical students in sub-Saharan Africa. To our knowledge, only one peer-reviewed article has examined

patient-centered attitudes among sub-Saharan African medical students; this study from South Africa found low patient-centeredness that declined among students in progressively higher academic years [20]. Using the Patient-Practitioner Orientation Scale (PPOS), the authors reported that students were higher in the “caring” aspect of patient-centeredness (“the extent to which the respondent sees the patient’s expectations, feelings, and life circumstances as critical elements in the treatment process”) than in the “sharing” aspect (“the extent to which the respondent believes that patients desire information and should be part of the decision making process”)[20,21]. Results from this study, however, cannot easily be generalized to other areas of sub-Saharan Africa, considering the unique context of medical education in South Africa. South Africa is home to many of the region’s oldest medical schools, has been the setting for more peer-reviewed articles on medical education than any other country in sub-Sahara Africa, and has a highly unique demographic profile of students (only 39% identify as black and 13% as colored)[13,22]. In order to more accurately inform patient-centered curricula for schools in sub-Saharan Africa, further research is needed that assesses current attitudes among students and establishes valid measures.

We conducted our study at the medical school of the University of Sciences, Techniques and Technology of Bamako, with a student body from Mali and a number of other West African francophone countries. Our objectives were to assess patient-centered attitudes among medical students, determine if patient-centered attitudes vary according to academic year and demographic factors, and test the construct validity and internal consistency of the PPOS in this setting.

METHODS

Design, setting, and participants

We conducted a cross-sectional survey of students in a six-year medical training program at the University of Sciences, Techniques and Technology of Bamako at the start of the 2016 academic year. To obtain a range of academic years, we chose to administer the survey to 1st, 3rd and 5th/6th

year students. We distributed and collected the paper survey at the beginning of large lecture classes for 1st and 3rd year medical students at the beginning of the 2016 academic year. As 5th/6th year medical students were off campus in clinical rotations, we distributed and collected the surveys through class leaders.

Measures

Originally developed in the United States [21], the PPOS has been used to assess patient-centered attitudes of medical students, providers, and patients in several different countries. The tool asks participants to indicate the extent to which they agree or disagree with 18 statements regarding the patient-provider relationship. Responses are provided on a 6-point Likert scale that ranges from ‘strongly agree’ to ‘strongly disagree.’ To reduce social desirability bias, most statements are negatively worded (reflecting a provider-dominant or disease-centered orientation), while a few items are worded in a positive direction (reflecting a patient-centered orientation). In the original scale development study, Krupat and colleagues reported satisfactory internal consistency ($\alpha=0.73$) and a two-factor structure (“sharing” and “caring”) [21]. The PPOS has demonstrated moderate predictive validity with some patient-centered measures in the Roter Interaction Analysis System (a tool for coding clinical dialogue), as well as with patient satisfaction outcomes [21,23].

A bilingual team of medical faculty members in Mali translated the original 18 items into French and then back-translated them into English, guided by phrasing from an adaptation for patients in Sierra Leone [14]. We conducted three rounds of pre-testing and revisions with small groups of medical students that included the use of cognitive interviewing to ensure questions were interpreted as intended [24]. We also asked participants to indicate their age, gender, whether they were raised in an urban or rural area, and whether they would like to practice medicine in an urban or rural area.

Data collection

To obtain a range of academic years, we chose to administer the survey to 1st, 3rd and 5th/6th year students. We administered the survey to 1st and 3rd year medical students by distributing and collecting the paper survey to all students attending class-wide lectures. Class leaders distributed and collected surveys of 5th and 6th year students, as these students were off campus in clinical placements. In order to achieve an adequately sized sub-group of these less accessible students and because they are in a similar period of training, we analyzed 5th and 6th year students together.

Data analysis

Research assistants manually entered the paper survey data into an electronic spreadsheet, which we transferred to Stata 13 for analysis [25]. The first author double-entered a random 10% sub-sample of the data to assess and correct any patterns of error (which were not found). Factor analyses were conducted in MPlus version 7 [26].

We first conducted an item-by-item analysis by calculating the proportion of the sample that agreed with each statement (combining the proportion that responded “strongly agree”, “mostly agree” or “agree”). We analyzed the items in the direction they were originally posed to participants, so that higher scores would consistently represent stronger agreement with the statement. We used Pearson’s chi-squared test to determine if the proportion who agreed with each statement was significantly different according to academic year or gender. We then calculated scores for the composite PPOS and the two subscales according to its original scoring methods [21]. Specifically, we reverse-scored positively worded items and calculated composite scores by taking the mean of non-missing items. Composite scores for the full scale and sub-scale have a possible range of 1-6, with higher values indicating higher patient-centeredness. We compared means between academic years using one-way ANOVA.

To evaluate the scale’s psychometrics, we first calculated internal consistency of the PPOS and sub-scales using Cronbach’s alpha. We then performed a confirmatory factor analysis (CFA) to assess the presumed two-factor structure, using a polychoric correlation structure with a robust diagonally weighted least squares estimation [20]. We fixed the variances of the two factors and allowed them to correlate using a geomin (a type of oblique) rotation [27]. To assess model fit, we examined a chi-squared test of model fit against baseline model, root mean square error approximation (RMSEA), and comparative fit indices to a baseline model (CFI/TLI) according to criteria outlined by Hu and Bentler (RMSEA=0.072; CFI=0.523; TLI=0.455) [28]. We also examined the magnitude and statistical significance of factor loadings and item residual variance. To determine if an alternative factor structure would better fit the data, we conducted an exploratory factor analysis (EFA) using methods outlined by Costello and Osborne [29].

Ethical considerations

This study was approved by the Institutional Review Boards at the Johns Hopkins Bloomberg School of Public Health and the University of Sciences, Techniques & Technologies of Bamako.

RESULTS

Sample demographics

We collected surveys from 453 students. Of these, eight were discarded: five due to having greater than 20% missing data and three for having a single response choice for all questions (suggesting that the participant simply filled in one response instead of basing responses on a careful consideration of the questions). Twelve additional surveys were discarded because they were mistakenly completed by 2nd year students, who were not part of the target sample. Overall

participant response rate was not possible to calculate, as surveys for 5th and 6th years students were distributed informally through social networks.

Of the 430 surveys analyzed, 286 (66.5%) were completed by male participants; 18 (4.2%) were missing data for gender (Table 1). First-year students made up 57.7% of the sample, while 3rd year students made up 23.5% and 5th/6th year students made up 18.8%. A slight majority of students were raised in urban areas (54.9%) and 12.8% were missing a response about where they were raised. Approximately half of students reported they wanted to practice medicine in an urban area, 27.8% in a rural area, while 21.6% did not indicate a preference.

Table 1: Demographics of sample of medical students in Bamako, Mali (n=430)

| | 1 st year n(%) | 3 rd year n(%) | 5/6 th year n(%) | Total Sample n(%) |
|-------------------------|------------------------------|------------------------------|--------------------------------|----------------------|
| Sex | | | | |
| Male | 157 (63.3) | 79 (78.2) | 50 (61.7) | 286 (66.5) |
| Female | 81 (32.7) | 18 (17.8) | 27 (33.3) | 126 (29.3) |
| Missing | 10 (4.0) | 4 (4.0) | 4 (4.9) | 18 (4.2) |
| Raised in: | | | | |
| Rural area | 74 (29.8) | 35 (34.7) | 30 (37.0) | 139 (32.3) |
| Urban area | 139 (56.1) | 56 (55.5) | 41 (50.6) | 236 (54.9) |
| Missing | 35 (14.1) | 10 (9.9) | 10 (12.4) | 55 (12.8) |
| Want to work in: | | | | |
| Rural area | 67 (27.0) | 34 (33.7) | 27 (33.3) | 123 (27.8) |
| Urban area | 129 (52.0) | 45 (44.6) | 35 (43.2) | 209 (48.6) |
| Missing | 52 (21.0) | 22 (21.8) | 19 (23.5) | 93 (21.6) |
| Total | 248 (57.7) | 101 (23.5) | 81 (18.8) | 430 (100) |

Analysis of individual patient-centeredness items

In seven out of the nine sharing items, a majority of students favored a more provider-dominant style (Table 2). For example, 64% felt that the doctor should decide what is said during the consultation (item 1) and 91% believed that the patient must always be conscious that the doctor should lead the consultation (item 15). In five of the nine caring items, the majority of students favored higher caring. For example, only 27% agreed that the relation with the patient is not as important as a good diagnosis and treatment and 86% felt that humor is an important factor

in treatment. Yet in the other four caring items, the majority of students responded in a manner consistent with a lower caring (or more disease-centered) orientation. For example, only 41% felt that a successful treatment plan must agree with the way a patient prefers to live their life (item 13) and 74% felt that it is more important for a doctor to have good medical techniques than interest in the social component of the patient (item 2).

Comparisons by academic year showed significant differences in four of the nine sharing items and four of the nine caring items. In all eight of these items, patient-centered attitudes were more prevalent among students in the 5th/6th years as compared to students in the 1st year. Six of the eight items displayed a linear trend of increasing patient-centeredness with increases in academic year. Overall, only two items displayed significant gender response differences, with more males favoring a provider-dominated style in item 4 (“The most important part of the medical visit is the physical exam”), but more females favoring a provider-dominated style in item 8 (“Many patients continue asking questions even if the doctor has already given an explanation”).

Table 2: Percent of students in agreement with items from the Patient-Practitioner Orientation Scale (PPOS) with comparisons by academic year and gender

| Sharing items | | Academic year | | | Academic year comparison χ^2 (2) | Total sample | Orientation of majority of sample |
|---------------|---|---------------|------|------|---------------------------------------|--------------|-----------------------------------|
| | | 1 | 3 | 5/6 | | | |
| 1 | The doctor should decide what is said during the consultation | 65.3 | 56.3 | 69.7 | 3.02 | 63.9 | Provider-dominant |
| 4 | The most important part of the medical visit is the physical exam | 41.6 | 34.7 | 22.2 | 9.91** | 36.2 | Patient-centered |
| 5 | Patients should rely on the doctor's knowledge and not try to find out about their medical condition on their own | 66.1 | 55.5 | 46.2 | 14.03** | 59.3 | Provider-dominant |
| 8 | Many patients continue asking questions even if the doctor has already given an explanation | 77.1 | 71.7 | 60.5 | 8.44* | 72.6 | Provider-dominant |
| 9 | Patients should be treated as if they were partners with the doctor, equal in power and status † | 79.0 | 71.4 | 69.1 | 4.25 | 75.4 | Patient-centered |
| 10 | Patients generally want reassurance rather than information about their health | 73.0 | 73.0 | 69.1 | 0.48 | 72.2 | Provider-dominant |

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|--|---|------|------|------|----------|------|-------------------|
| 12 | When patients disagree with their doctor, this is a sign that the doctor does not have the patient's respect and trust | 68.2 | 65.7 | 67.9 | 0.21 | 67.5 | Provider-dominant |
| 15 | The patient must always be conscious that the doctor should lead the consultation | 94.6 | 84.6 | 87.7 | 9.48** | 91.0 | Provider-dominant |
| 18 | When patients seek medical information outside of the clinic, this usually confuses more than it helps | 80.9 | 79.8 | 77.8 | 0.38 | 80.1 | Provider-dominant |
| Caring items | | | | | | | |
| 2 | It is more important for doctor to good medical techniques than it is to have interest in the social component of the patient | 82.2 | 62.0 | 60.5 | 23.3*** | 73.4 | Disease-centered |
| 3. | The most important part of the medical visit is the physical exam | 44.6 | 50.5 | 35.8 | 3.95 | 44.3 | Patient-centered |
| 6 | When doctors ask a lot of questions about a patient's background, they are prying too much into personal matters | 66.1 | 55.5 | 43.2 | 14.03** | 59.3 | Disease-centered |
| 7 | If a doctor does a good diagnosis and treatment, the relation with the patient is not as important | 31.1 | 24.2 | 18.5 | 5.39 | 27.1 | Patient-centered |
| 11 | If a doctor focuses too much on being friendly, they will not have a lot of success | 88.6 | 83.8 | 67.5 | 19.44*** | 83.5 | Disease-centered |
| 13 | For a treatment plan to succeed, it must agree with the way a patient prefers to live their life † | 37.9 | 48.0 | 43.8 | 3.12 | 40.5 | Disease-centered |
| 14 | Most patients want to get in and out of the doctor's office as quickly as possible | 47.1 | 41.0 | 32.1 | 5.79 | 42.8 | Disease-centered |
| 16 | It is not that important to know a patient's background in order to treat the person's illness | 23.1 | 6.3 | 6.3 | 21.23*** | 16.0 | Patient-centered |
| 17 | Humor is an important factor in the way a doctor treats a the patient † | 86.1 | 81.6 | 90.0 | 2.57 | 85.8 | Patient-centered |
| † Positively-worded item. Unlike other items, agreement with these statement indicate a patient-centered orientation * p<0.05; ** p<0.01; *** p<0.001 | | | | | | | |

PPOS scoring

According to the scale’s original coding, mean PPOS score for the entire sample was 3.38 (SD=0.48), near the midpoint of the possible range (1-6). Mean score was slightly lower for the sharing sub-scale 3.04 (SD=0.60) and slightly higher for the caring sub-scale, 3.68 (SD=0.62). One-way ANOVAs comparing scores by academic year suggested significant difference in means for the entire scale ($\chi^2=6.85$; $p=0.033$) and the caring sub-scale ($\chi^2=15.03$; $p=0.001$), where scores of students in 5th/6th years were more patient-centered than those in the 1st year (Figure 1). There was no significant difference when comparing means of the sharing subscale between academic years ($\chi^2=0.69$; $p=0.707$).

PPOS psychometrics

Cronbach’s alpha was low for both the full scale ($\alpha=0.58$), the caring sub-scale ($\alpha=0.37$) and the sharing sub-scale ($\alpha=0.48$). The CFA did not support the scale’s original two-factor structure, as illustrated by the poor item-factor loadings (most less than 0.4) in Figure 2. While the chi-squared test of model fit indicated an improved fit over the baseline model ($\chi^2=773.0$; $df=153$; $p<0.001$), other goodness-of-fit statistics were poor.

In the EFA, inter-item correlations were generally low. Eigenvalues and parallel principal components analysis suggested a seven-factor model, but many individual items exhibited consistently low loadings for any given factor. We repeated the EFA with various iterations, dropping items with high uniqueness and poor loading, yet loadings remained low and we could not identify an interpretable factor structure with suitable goodness-of-fit statistics.

DISCUSSION

This study aimed to assess patient-centered attitudes among medical students in West Africa. In most items in the “sharing” sub-scale, responses indicated attitudes aligned with a “provider-dominant” style of care versus a patient-centered one among the majority of students. In the “caring” sub-scale, the majority responded favorably toward patient-centeredness in some items, but toward more “disease-centered” or “low caring” attitudes in other items. In many items, patient-centered attitudes were more prevalent among students in higher academic years, but there were few differences by gender.

Attitudes favoring a more provider-dominated style of care, particularly in the 91% of students that agreed the patient must always be conscious that the doctor should lead the consultation, reveal a priority for future medical training in West Africa. Developing skills in sharing power with patients may yield benefits in this setting, as a previous survey conducted among in patients in Bamako revealed a substantial proportion preferred “shared power” over a provider-dominant style [30]. These patients were also more likely to give lower ratings of the quality of patient-provider communication at their care facility, suggesting disconnect between their preferred style and the style they experience.

Responses toward caring items also reveal target areas for training. For instance, students generally acknowledged the importance of the relationship with the patient and even the use of humor, but less than half agreed that a treatment plan must be concordant with a patient’s way of life in order to succeed. In our previous qualitative work, patients in Bamako appreciated friendliness and generally regarded their providers as friendly. However, they reported that providers did not often seek to understand and address their individual issues underlying poor medication adherence or missed appointments [31]. Curricula that enhance skills in eliciting and supporting lifestyle and psychosocial influents on patient health may prepare future providers to better address issues like adherence.

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Unlike previous studies, we found no evidence of lower patient-centeredness in students of higher academic year. For some items, there appeared to be general trends toward higher patient-centeredness with higher academic years. It is possible that there is a positive effect of training on patient-centered orientation, as students in advanced years are likely to have had extended clinical experiences similar to the longitudinal integrated clerkships, which are replacing short-term rotations in some high-income settings due to their positive impact on developing patient-centeredness in students [32]. However, our findings could be explained by selection bias: Typically, only one-fifth of first year students pass the exam permitting them to continue to subsequent training, resulting in a more selective student body in later academic years. While this exam tests clinical knowledge and not patient-centered attitudes or skills, it may be that students with more academic ability or commitment are also those who hold more patient-centered attitudes in items where this trend was observed. Selection bias could have also occurred in sampling, as 5th/6th year students were sampled through social networks, and only 1st and 3rd year students who attended class on the day of the survey were included.

According to the original PPOS scoring, our sample of Malian medical students was moderately oriented toward the caring aspect of patient-centeredness and slightly less orientated toward the sharing aspect. Compared to previous studies, mean PPOS score (3.38) was higher (more patient-centered) than the mean reported among South African medical students (2.24-2.65), comparable to students in Pakistan (3.40) and Greece (3.81-3.96) but lower than students in U.S (4.57) and Brazil (4.66)[6,7,10,20,33]. However, scores from our study and the others we cite should be interpreted with caution, as internal consistency and construct validity measures were either inadequate or not reported in the publications.

Our internal consistency measures and factor analyses raise concerns about applying the PPOS outside of the high-income setting where it was developed. Among the many studies that have applied the PPOS in an international context, we only identified two that attempted to assess the

structure and construct validity of the scale. In the previously cited South African study, Archer and colleagues reported poor internal consistency and no evidence of a latent factor structure in CFA or EFA [20]. Pereira and colleagues concluded that the Brazilian adaptation of PPOS had acceptable internal consistency among physicians and medical students, however, the Cronbach's alpha ($\alpha=0.605$, similar to our 0.580). fell below the commonly accepted standard of 0.70 as an indication of adequate internal consistency [34]. Similar to our findings, the factors extracted in the EFA conducted by Pereira and colleagues did not correspond with the original "caring" and "sharing" dimensions, and the fit statistics of the CFA were borderline acceptable.

The differences in structure and measurement properties we observed with the PPOS may be due to limitations of the measure itself or to differences in the way that the patient-provider relationship is conceptualized in this West African context. When examined against our qualitative findings, many of the original PPOS items did not directly reflect the values and experiences patients had expressed [31]. Notably, the PPOS contains a number of items about the patient's access to information, which rarely entered discussions with our patient participants in Bamako. The concept of patient-centeredness may vary in different cultural settings [35] and might ultimately be best defined by the patients themselves [36]. For future research aiming to measure patient-centeredness as a unified construct in sub-Saharan Africa, we recommend developing and validating contextually-relevant scales based on careful selection of appropriate items from existing measures as well as new items derived through formative research. Barry and colleagues applied this method to develop a scale assessing the patient-provider relationship in prevention of mother-to-child transmission facilities in South Africa; that scale demonstrated high internal consistency and strong factor loadings [37].

One limitation of our study is the remaining possibility that even after multiple rounds of pretesting, some questions may not have been interpreted as intended by all participants. A more systematic approach to the translation of items, like the Delphi method applied by Pereira and

colleagues [38], may have helped improve the translation quality. Additionally, our cross-sectional data, as well as the potential for selection bias previously noted, limits us from drawing any conclusions about the causal effect of medical training on comparisons between academic year. Though we conducted this study at one of the major medical training facilities in West Africa, the fact it was conducted at only one institution may limit generalizability of findings. Finally, the PPOS measures attitudes, which do not always translate into the provider behaviors that relate to better care outcomes. While attitudes and orientation are important, measuring specific communication skills in providers (as well as their effect on patient outcomes) should be incorporated into educational efforts that aim to promote better patient-provider relationships [11].

As chronic conditions continue to increase the need for long-term, effective patient-provider relationships, it is critical for medical schools in sub-Saharan Africa to prepare future providers to practice with a patient-centered orientation. Successful piloting of curricula, however, requires improved measurement tools based on terminology, concepts and clinical experiences relevant to local settings. Nonetheless, our findings among West African medical students—in the context of the patient literature from the region—suggest that developing effective skills and favorable attitudes toward power-sharing and addressing lifestyle factors is likely to yield benefits to their future patients.

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Contributions: EAH led the design of the work, as well as the acquisition, analysis and interpretation of data and drafting of the manuscript. SD contributed to the design of the work, the acquisition and interpretation of data, and important intellectual revisions to the manuscript. CEK, PJW, DLR and SAH contributed to the design of the work, the interpretation of data, and important intellectual revisions to the manuscript. SMM contributed to the analysis and interpretation of data as well as important intellectual revisions to the manuscript.

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Data sharing statement: Possibility for data sharing can be discussed with the corresponding author.

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Figure Captions

Figure 1: Mean scores with 95% confidence intervals of the full Patient-Practitioner Orientation Scale and sub-scales in a sample of 1st, 3rd, and 5th/6th year medical students in Bamako, Mali (n=430)

Figure 2. Confirmatory factor analysis of the Patient-Practitioner Orientation Scale in a sample of Malian medical students (n=430)

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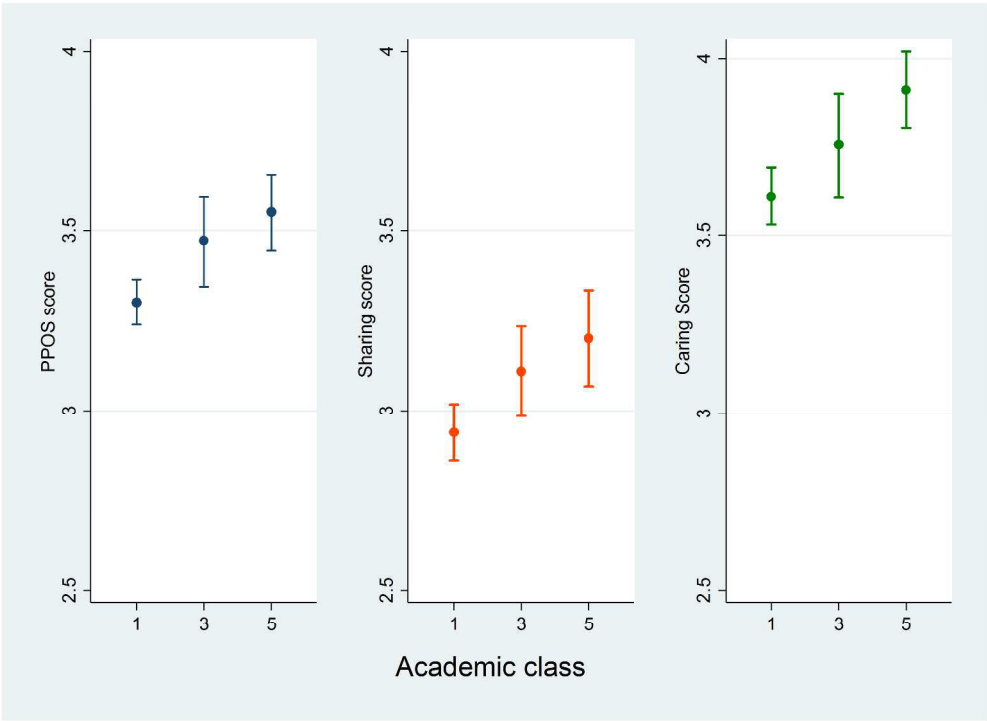


Figure 1: Mean scores with 95% confidence intervals of the full Patient-Practitioner Orientation Scale and sub-scales in a sample of 1st, 3rd, and 5th/6th year medical students in Bamako, Mali (n=430)

887x649mm (96 x 96 DPI)

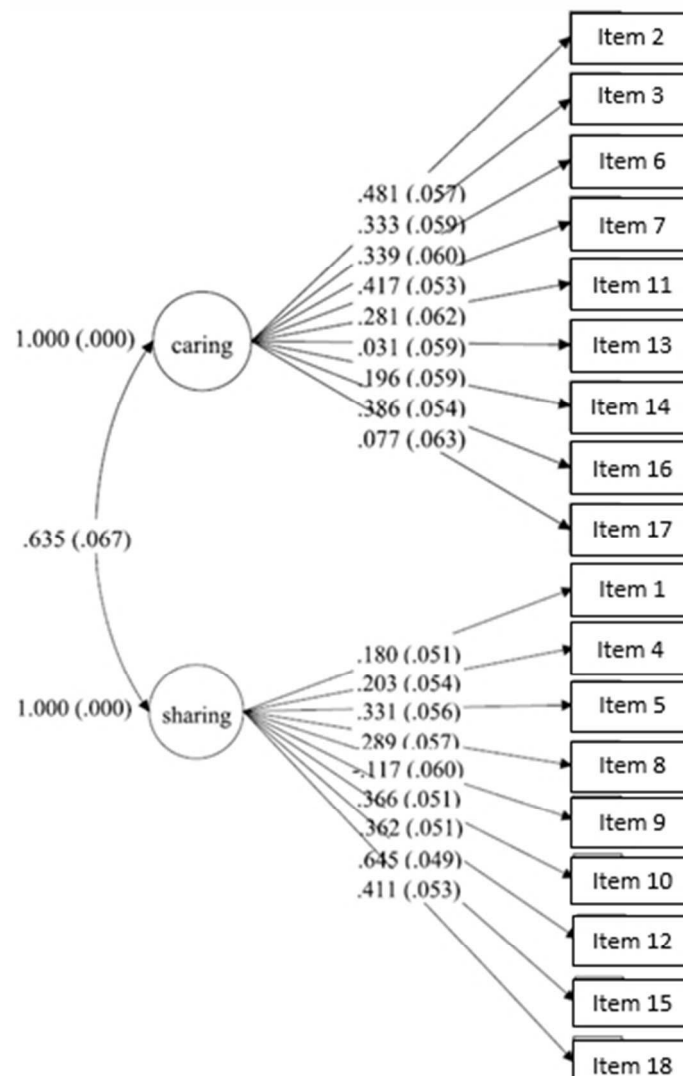


Figure 2. Confirmatory factor analysis of the Patient-Practitioner Orientation Scale in a sample of Malian medical students (n=430)

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STROBE Statement—checklist of items that should be included in reports of observational studies

| | Item No | Recommendation | Reference in Manuscript |
|------------------------------|---------|--|-------------------------|
| Title and abstract | 1 | (a) Indicate the study’s design with a commonly used term in the title or the abstract | Page 2 |
| | | (b) Provide in the abstract an informative and balanced summary of what was done and what was found | Page 2 |
| Introduction | | | |
| Background/rationale | 2 | Explain the scientific background and rationale for the investigation being reported | Pages 5-6 |
| Objectives | 3 | State specific objectives, including any prespecified hypotheses | Page 6 |
| Methods | | | |
| Study design | 4 | Present key elements of study design early in the paper | Page 6 |
| Setting | 5 | Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection | Page 6 |
| Participants | 6 | (a) Cohort study—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up Case-control study—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls Cross-sectional study—Give the eligibility criteria, and the sources and methods of selection of participants | Page 8 |
| | | (b) Cohort study—For matched studies, give matching criteria and number of exposed and unexposed Case-control study—For matched studies, give matching criteria and the number of controls per case | N/A |
| Variables | 7 | Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable | Page 7 |
| Data sources/ measurement | 8* | For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group | Page 6 |
| Bias | 9 | Describe any efforts to address potential sources of bias | Page 7-8 |
| Study size | 10 | Explain how the study size was arrived at | Page 8 |
| Quantitative variables | 11 | Explain how quantitative variables were handled in the analyses. If applicable, describe which | Page 8-9 |

| | | | |
|---------------------|----|--|----------------|
| | | groupings were chosen and why | |
| Statistical methods | 12 | (a) Describe all statistical methods, including those used to control for confounding | Page 8-9 |
| | | (b) Describe any methods used to examine subgroups and interactions | Page 8 |
| | | (c) Explain how missing data were addressed | Page 8, Page 9 |
| | | (d) <i>Cohort study</i> —If applicable, explain how loss to follow-up was addressed | N/A |
| | | <i>Case-control study</i> —If applicable, explain how matching of cases and controls was addressed | |
| | | <i>Cross-sectional study</i> —If applicable, describe analytical methods taking account of sampling strategy | |
| | | (e) Describe any sensitivity analyses | N/A |

Continued on next page

Results

| | | | |
|-------------------|-----|--|---------------------|
| Participants | 13* | (a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed | Page 9-10 |
| | | (b) Give reasons for non-participation at each stage | N/A |
| | | (c) Consider use of a flow diagram | N/A |
| Descriptive data | 14* | (a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders | Page 10, Table 1 |
| | | (b) Indicate number of participants with missing data for each variable of interest | Table 1 |
| | | (c) Cohort study—Summarise follow-up time (eg, average and total amount) | N/A |
| Outcome data | 15* | Cohort study—Report numbers of outcome events or summary measures over time | N/A |
| | | Case-control study—Report numbers in each exposure category, or summary measures of exposure | N/A |
| | | Cross-sectional study—Report numbers of outcome events or summary measures | Page 10-12, Table 2 |
| Main results | 16 | (a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included | Page 10-12, Table 2 |
| | | (b) Report category boundaries when continuous variables were categorized | N/A |
| | | (c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period | N/A |
| Other analyses | 17 | Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses | Page 10-13, Table 2 |
| Discussion | | | |
| Key results | 18 | Summarise key results with reference to study objectives | Page 14 |
| Limitations | 19 | Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias | Page 16-17 |
| Interpretation | 20 | Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence | Page 14-16 |
| Generalisability | 21 | Discuss the generalisability (external validity) of the study results | Page 17 |
| Other information | | | |
| Funding | 22 | Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based | Page 18 |

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at www.strobe-statement.org.

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Patient-centered attitudes among medical students in Mali, West Africa: a cross-sectional study

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**Patient-centered attitudes among medical students in Mali, West Africa:
a cross-sectional study**

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Keywords: Patient-centeredness, medical students, patient-provider communication, Mali, West Africa

Word count: 4,000

ABSTRACT

Background/objective: Patient-centered attitudes decline during U.S. medical training, yet little is known about attitudes among West African medical students. We sought to measure student attitudes toward patient-centeredness and examine validity of the 18-item Patient-Practitioner Orientation Scale (PPOS) in this context.

Participants/setting: 430 medical students in years 1, 3, 5 and 6 of a 6-year medical training program in Bamako, Mali.

Design: We conducted a cross-sectional survey and compared the proportion of students who agreed with each PPOS item by gender and academic year and calculated composite PPOS scores. To examine psychometrics of the PPOS and its two subscales ("sharing" and "caring"), we calculated internal consistency (Cronbach's alpha) and performed confirmatory and exploratory factor analyses (CFA and EFA).

Results: In seven of the nine "sharing" items, the majority of students held attitudes favoring a provider-dominant style. For five of the nine "caring" items, the majority of student responded consistently with patient-centered attitudes, while in the other four, responses indicated a disease-centered orientation. In eight items, a greater proportion of 5th/6th year students held patient-centered attitudes as compared to 1st year students; there were few gender differences. Average PPOS scores indicated students were moderately patient-centered, with more favorable attitudes toward the "caring" aspect than "sharing". Internal consistency of the PPOS was inadequate for the full scale ($\alpha=0.58$) and sub-scales ("sharing" $\alpha=0.37$; "caring" $\alpha=0.48$). CFA did not support the original PPOS factors and EFA did not identify an improved structure.

Conclusions: West African medical students training in Bamako are moderately patient-centered and do not show the same declines in patient-centered attitudes in higher academic years as seen in

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other settings. Medical students may benefit from training in shared power skills and in attending to patient lifestyle factors. Locally-validated tools are needed to guide West African medical schools in fostering patient-centeredness among students.

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STRENGTHS AND LIMITATIONS

- First study to measure patient-centered attitudes among medical students in West Africa and compare attitudes among gender and academic year.
- First study to examine psychometric properties of the widely-used Patient-Practitioner Orientation Scale in West Africa.
- Cross-sectional design limits ability to attribute differences between academic years to an effect of time in medical training.

INTRODUCTION

Sub-Saharan Africa faces a myriad of public health challenges, including the continued threat of major infectious disease (such as HIV, tuberculosis, and malaria), high maternal and child mortality rates, poor coverage of reproductive health services, and the emerging threat of chronic and non-communicable diseases [1]. Confronting these challenges requires a strong healthcare workforce and systems that can consistently deliver quality care, treatment and preventative services. Unfortunately, the World Health Organization (WHO) has stated concern that globally, education systems that train healthcare providers are “not currently well-equipped to respond to the challenges of 21st century,” particularly in low and middle income countries [2]. In order to meet the needs of patients, the WHO calls for a “transformative agenda” on the education of the health workforce that emphasizes competencies in “patient-centered” care.

“Patient-centered” describes an orientation of medical practice that “consciously adopts the patient’s perspective” by valuing the patient’s experience, acknowledging the psychosocial aspects of illness, and offering the patient an equal role in decision-making [3]. This core philosophy challenges heavy emphasis on biological aspects of disease and skewed balance of power in patient-provider relationships often present in healthcare. In recent decades, mounting evidence has suggested that a patient-centered style of care can lead to an array of positive outcomes, including higher patient satisfaction, increased efficiency of diagnosis and referrals, better patient adherence to medication and behavioral regimens, fewer missed appointments, and even higher provider satisfaction [4–8].

Widespread integration of patient-centered care in sub-Saharan Africa could result in a range of positive impacts. Research from the region has already revealed when patient-centeredness is practiced, it can result in better adherence to family planning methods [9] and greater patient engagement in HIV care [10]. Evidence also suggests that patients in sub-Saharan

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3 Africa generally prefer a patient-centered style of practice [11–13]. Their providers, however, tend
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5 to be more “provider-dominant” and “disease-centered” in their practice orientation [14,15].
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7 Multi-level barriers have prevented patient-centered care from wide adoption in sub-
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9 Saharan. The foundation of biomedical healthcare systems in the region are rigid, hierarchical,
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11 disease-control operations established by colonial powers [16]. Today, these systems are further
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13 confined by present-day international pressures to implement vertical, disease-specific programs
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15 that prioritize easily quantifiable outputs [16]. Yet one obvious reason why patient-centered care is
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17 not regularly practiced is that providers are not trained to deliver it. To capitalize on the benefits
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19 for both patients and providers, training programs for health professionals in many high-income
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21 countries are increasingly adopting curricula that promotes patient-centeredness. These curricula
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23 also aim to counter the decline of patient-centered attitudes during the course of medical education
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25 observed in longitudinal studies in the United States and Greece and inferred from a number of
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27 cross-sectional studies internationally [17–21]. Reductions in patient-centered attitudes in medical
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29 school may result from the heavy emphasis medical programs place on the biological aspects of
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31 disease, as well as the emotional burn-out medical students may develop as their responsibilities
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33 and work load intensify [22]. Despite evidence supporting positive outcomes of such curricula, few
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35 medical schools in sub-Saharan Africa have implemented formal programs to promote a patient-
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37 centered orientation or teach related communication skills [23,24]. Infusing patient-centeredness
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39 into medical school curricula could help future providers deliver quality care and build effective
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41 health systems. Developing such training requires an understanding of existing levels and patterns
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43 of attitudes toward patient-centeredness. Yet presently, research on such attitudes among medical
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45 students in sub-Saharan Africa is scarce. To our knowledge, only one peer-reviewed article has
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47 examined patient-centered attitudes among sub-Saharan African medical students; this study from
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49 South Africa found low patient-centeredness that declined among students in progressively higher
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51 academic years [25]. Using the Patient-Practitioner Orientation Scale (PPOS), the authors reported
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that students were higher in the “caring” aspect of patient-centeredness (“the extent to which the respondent sees the patient’s expectations, feelings, and life circumstances as critical elements in the treatment process”) than in the “sharing” aspect (“the extent to which the respondent believes that patients desire information and should be part of the decision making process”)[25,26]. Results from this study, however, cannot easily be generalized to other areas of sub-Saharan Africa, considering the unique context of medical education in South Africa. South Africa is home to many of the region’s oldest medical schools, has been the setting for more peer-reviewed articles on medical education than any other country in sub-Sahara Africa, and has a highly unique demographic profile of students (only 39% identify as black and 13% as colored)[24,27]. In order to more accurately inform patient-centered curricula for schools in sub-Saharan Africa, further research is needed that assesses current attitudes among students and establishes valid measures.

We conducted our study at the medical school of the University of Sciences, Techniques and Technology of Bamako, with a student body from Mali and a number of other West African francophone countries. In addition to the aforementioned challenges of delivering patient-centered care in sub-Saharan Africa, providers in Mali face unique challenges of maintaining quality services in a highly decentralized, primary health care system [28], and ensuring access to care in hard-to-reach rural and conflict-ridden areas [29]. Our objectives were to assess patient-centered attitudes among medical students, determine if patient-centered attitudes vary according to academic year and demographic factors, and test the construct validity and internal consistency of the PPOS in this setting.

METHODS

Study design and participants

We conducted a cross-sectional survey of students in a six-year medical training program at the University of Sciences, Techniques and Technology of Bamako at the start of the 2016 academic

year. Participants included 1st year students (who train in the classroom with little to no patient contact), 3rd year students (who have some observational exposure to patients in addition to classroom work) and 5th and 6th year students (who train in clinical locations with regular patient contact).

Measures

Originally developed in the United States [26], the PPOS has been used to assess patient-centered attitudes of medical students, providers, and patients in several different countries. The tool asks participants to indicate the extent to which they agree or disagree with 18 statements regarding the patient-provider relationship. Responses are provided on a 6-point Likert scale that ranges from 'strongly agree' to 'strongly disagree.' To reduce social desirability bias, most statements are negatively worded (reflecting a provider-dominant or disease-centered orientation), while a few items are worded in a positive direction (reflecting a patient-centered orientation). In the original scale development study, Krupat and colleagues reported satisfactory internal consistency ($\alpha=0.73$) and a two-factor structure ("sharing" and "caring") [26]. The PPOS has demonstrated moderate predictive validity with some patient-centered measures in the Roter Interaction Analysis System (a tool for coding clinical dialogue), as well as with patient satisfaction outcomes [26,30].

A bilingual team of medical faculty members in Mali translated the original 18 items into French and then back-translated them into English, guided by phrasing from an adaptation for patients in Sierra Leone [11]. We conducted three rounds of pre-testing and revisions with small groups of medical students that included the use of cognitive interviewing to ensure questions were interpreted as intended [31]. We also asked participants to indicate their age, gender, whether they were raised in an urban or rural area, and whether they would like to practice medicine in an urban or rural area.

Sampling and data collection

The entire student body consisted of 3,846 students. To obtain a parsimonious representation of students in their early, mid and advanced years of training, we chose to administer the survey to 1st, 3rd and 5th/6th year students. Registered students in these academic years included 1,214 in the 1st year, 571 in the 3rd year, 415 in the 5th year, and 401 in the 6th year. The larger number of students in the first year is explained by the structure of the training. After the first year, a smaller proportion of students pass exams admitting them to subsequent training.

In order to have sufficient power ($1-\beta=0.80$) to detect a small effect size for a one-way ANOVA comparing the three groups ($\alpha=0.05$), we aimed to sample 289 students per group. To sample first-year students, we distributed and collected surveys in large lecture classes through a systematic sampling design. We also visited lectures for 3rd year students, opening up the survey to all students attending. Fifth and 6th years are similar in structure- students are typically off-site in clinical placements. Anticipating challenges obtaining an adequate sample size for one class of students, we decided to sample both 5th and 6th year students as one group. For these students, we distributed and collected the surveys through class leaders.

Data analysis

Research assistants manually entered the paper survey data into an electronic spreadsheet, which we transferred to Stata 13 for analysis [32]. The first author double-entered a random 10% sub-sample of the data to assess and correct any patterns of error (which were not found). Factor analyses were conducted in MPlus version 7 [33].

We first conducted an item-by-item analysis by calculating the proportion of the sample that agreed with each statement (combining the proportion that responded “strongly agree”, “mostly agree” or “agree”). We analyzed the items in the direction they were originally posed to participants, so that higher scores would consistently represent stronger agreement with the

statement. We used Pearson's chi-squared test to determine if the proportion who agreed with each statement was significantly different according to academic year or gender. We then calculated scores for the composite PPOS and the two subscales according to its original scoring methods [26]. Specifically, we reverse-scored positively worded items and calculated composite scores by taking the mean of non-missing items. Composite scores for the full scale and sub-scale have a possible range of 1-6, with higher values indicating higher patient-centeredness. For each scale and sub-scale, we compared means across different years of medical school using one-way ANOVA, and when differences were detected, we conducted subsequent Tukey-adjusted pairwise comparisons

To evaluate the scale's psychometrics, we first calculated internal consistency of the PPOS and sub-scales using Cronbach's alpha. We then performed a confirmatory factor analysis (CFA) to assess the presumed two-factor structure, using a polychoric correlation structure with a robust diagonally weighted least squares estimation [25]. We fixed the variances of the two factors and allowed them to correlate using a geomin (a type of oblique) rotation [34]. To assess model fit, we examined a chi-squared test of model fit against baseline model, root mean square error approximation (RMSEA), and comparative fit indices to a baseline model (CFI/TLI) according to criteria outlined by Hu and Bentler (RMSEA=0.072; CFI=0.523; TLI=0.455) [35]. We also examined the magnitude and statistical significance of factor loadings and item residual variance. To determine if an alternative factor structure would better fit the data, we conducted an exploratory factor analysis (EFA) using methods outlined by Costello and Osborne [36].

Ethical considerations

This study was approved by the Institutional Review Boards at the Johns Hopkins Bloomberg School of Public Health and the University of Sciences, Techniques & Technologies of Bamako.

RESULTS

Sample demographics

We collected surveys from 453 students, representing 17% of the total population of students in the selected academic years. Of these, eight were discarded: five due to having greater than 20% missing data and three for having a single response choice for all questions (suggesting that the participant simply filled in one response instead of basing responses on a careful consideration of the questions). Twelve additional surveys were discarded because they were mistakenly completed by 2nd year students, who were not part of the target sample. Overall participant response rate was not possible to calculate, as surveys for 5th and 6th years students were distributed informally through social networks. Attendance at classroom lectures and the rate of distribution through social networks were lower than anticipated, resulting in a lower than expected sample size.

Of the 430 surveys analyzed, 286 (66.5%) were completed by male participants; 18 (4.2%) were missing data for gender (Table 1). First-year students made up 57.7% of the sample, while 3rd year students made up 23.5% and 5th/6th year students made up 18.8%. A slight majority of students were raised in urban areas (54.9%) and 12.8% were missing a response about where they were raised. Approximately half of students reported they wanted to practice medicine in an urban area, 27.8% in a rural area, while 21.6% did not indicate a preference.

Table 1: Demographics of sample of medical students in Bamako, Mali (n=430)

| | 1 st year n(%) | 3 rd year n(%) | 5/6 th year n(%) | Total Sample n(%) |
|-----------------------------|------------------------------|------------------------------|--------------------------------|----------------------|
| Sex | | | | |
| Male | 157 (63.3) | 79 (78.2) | 50 (61.7) | 286 (66.5) |
| Female | 81 (32.7) | 18 (17.8) | 27 (33.3) | 126 (29.3) |
| Missing | 10 (4.0) | 4 (4.0) | 4 (4.9) | 18 (4.2) |
| Raised in: | | | | |
| Rural area | 74 (29.8) | 35 (34.7) | 30 (37.0) | 139 (32.3) |
| Urban area | 139 (56.1) | 56 (55.5) | 41 (50.6) | 236 (54.9) |
| Missing | 35 (14.1) | 10 (9.9) | 10 (12.4) | 55 (12.8) |
| Want to work in: | | | | |

| | | | | |
|--------------|-------------------|-------------------|------------------|------------------|
| Rural area | 67 (27.0) | 34 (33.7) | 27 (33.3) | 123 (27.8) |
| Urban area | 129 (52.0) | 45 (44.6) | 35 (43.2) | 209 (48.6) |
| Missing | 52 (21.0) | 22 (21.8) | 19 (23.5) | 93 (21.6) |
| Total | 248 (57.7) | 101 (23.5) | 81 (18.8) | 430 (100) |

Analysis of individual patient-centeredness items

In seven out of the nine sharing items, a majority of students favored a more provider-dominant style (Table 2). For example, 64% felt that the doctor should decide what is said during the consultation (item 1) and 91% believed that the patient must always be conscious that the doctor should lead the consultation (item 15). In five of the nine caring items, the majority of students favored higher caring. For example, only 27% agreed that the relation with the patient is not as important as a good diagnosis and treatment and 86% felt that humor is an important factor in treatment. Yet in the other four caring items, the majority of students responded in a manner consistent with a lower caring (or more disease-centered) orientation. For example, only 41% felt that a successful treatment plan must agree with the way a patient prefers to live their life (item 13) and 74% felt that it is more important for a doctor to have good medical techniques than interest in the social component of the patient (item 2).

Comparisons by academic year showed significant differences in four of the nine sharing items and four of the nine caring items. In all eight of these items, patient-centered attitudes were more prevalent among students in the 5th/6th years as compared to students in the 1st year. Six of the eight items displayed a linear trend of increasing patient-centeredness with increases in academic year. Overall, only two items displayed significant gender response differences, with more males favoring a provider-dominated style in item 4 ("The most important part of the medical visit is the physical exam"), but more females favoring a provider-dominated style in item 8 ("Many patients continue asking questions even if the doctor has already given an explanation").

Table 2: Percent of students in agreement with items from the Patient-Practitioner Orientation Scale (PPOS) with comparisons by academic year and gender

| Sharing items | | Academic year | | | Academic year comparison χ^2 (2) | Total sample | Orientation of majority of sample |
|---------------|---|---------------|------|------|---------------------------------------|--------------|-----------------------------------|
| | | 1 | 3 | 5/6 | | | |
| 1 | The doctor should decide what is said during the consultation | 65.3 | 56.3 | 69.7 | 3.02 | 63.9 | Provider-dominant |
| 4 | The most important part of the medical visit is the physical exam | 41.6 | 34.7 | 22.2 | 9.91** | 36.2 | Patient-centered |
| 5 | Patients should rely on the doctor's knowledge and not try to find out about their medical condition on their own | 66.1 | 55.5 | 46.2 | 14.03** | 59.3 | Provider-dominant |
| 8 | Many patients continue asking questions even if the doctor has already given an explanation | 77.1 | 71.7 | 60.5 | 8.44* | 72.6 | Provider-dominant |
| 9 | Patients should be treated as if they were partners with the doctor, equal in power and status † | 79.0 | 71.4 | 69.1 | 4.25 | 75.4 | Patient-centered |
| 10 | Patients generally want reassurance rather than information about their health | 73.0 | 73.0 | 69.1 | 0.48 | 72.2 | Provider-dominant |
| 12 | When patients disagree with their doctor, this is a sign that the doctor does not have the patient's respect and trust | 68.2 | 65.7 | 67.9 | 0.21 | 67.5 | Provider-dominant |
| 15 | The patient must always be conscious that the doctor should lead the consultation | 94.6 | 84.6 | 87.7 | 9.48** | 91.0 | Provider-dominant |
| 18 | When patients seek medical information outside of the clinic, this usually confuses more than it helps | 80.9 | 79.8 | 77.8 | 0.38 | 80.1 | Provider-dominant |
| Caring items | | | | | | | |
| 2 | It is more important for doctor to good medical techniques than it is to have interest in the social component of the patient | 82.2 | 62.0 | 60.5 | 23.3*** | 73.4 | Disease-centered |
| 3. | The most important part of the medical visit is the physical exam | 44.6 | 50.5 | 35.8 | 3.95 | 44.3 | Patient-centered |
| 6 | When doctors ask a lot of questions about a patient's background, they are prying too much into personal matters | 66.1 | 55.5 | 43.2 | 14.03** | 59.3 | Disease-centered |
| 7 | If a doctor does a good diagnosis and treatment, the relation with the patient is not as important | 31.1 | 24.2 | 18.5 | 5.39 | 27.1 | Patient-centered |
| 11 | If a doctor focuses too much on being friendly, they will not have a lot of success | 88.6 | 83.8 | 67.5 | 19.44*** | 83.5 | Disease-centered |
| 13 | For a treatment plan to succeed, it must agree with the way a patient prefers to live their life † | 37.9 | 48.0 | 43.8 | 3.12 | 40.5 | Disease-centered |

| | | | | | | | |
|----|--|------|------|------|----------|------|------------------|
| 14 | Most patients want to get in and out of the doctor's office as quickly as possible | 47.1 | 41.0 | 32.1 | 5.79 | 42.8 | Disease-centered |
| 16 | It is not that important to know a patient's background in order to treat the person's illness | 23.1 | 6.3 | 6.3 | 21.23*** | 16.0 | Patient-centered |
| 17 | Humor is an important factor in the way a doctor treats a the patient † | 86.1 | 81.6 | 90.0 | 2.57 | 85.8 | Patient-centered |

† Positively-worded item. Unlike other items, agreement with these statement indicate a patient-centered orientation

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

PPOS scoring

According to the scale's original coding, mean PPOS score for the entire sample was 3.38 (SD=0.48), near the midpoint of the possible range (1-6). Mean score was slightly lower for the sharing sub-scale 3.04 (SD=0.60) and slightly higher for the caring sub-scale, 3.68 (SD=0.62). One-way ANOVAs comparing scores by academic year suggested significant difference in means for the entire scale ($F=9.86$, $p < 0.001$), caring sub-scale ($F=7.44$; $p < 0.001$), and sharing sub-scale ($F=6.51$; $p=0.002$). Subsequent Tukey-adjusted pairwise comparisons suggested significantly higher composite, sharing, and caring scores in 5th/6th year students as compared to 1st year students (Figure 1). Third year students had higher significantly higher composite scores than 1st year students, but otherwise did not significantly differ from either comparison groups.

PPOS psychometrics

Cronbach's alpha was low for both the full scale ($\alpha=0.58$), the caring sub-scale ($\alpha=0.37$) and the sharing sub-scale ($\alpha=0.48$). The CFA did not support the scale's original two-factor structure, as illustrated by the poor item-factor loadings (most less than 0.4) in Figure 2. While the chi-squared test of model fit indicated an improved fit over the baseline model ($\chi^2=773.0$; $df=153$; $p < 0.001$), other goodness-of-fit statistics were poor.

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In the EFA, inter-item correlations were generally low. Eigenvalues and parallel principal components analysis suggested a seven-factor model, but many individual items exhibited consistently low loadings for any given factor. We repeated the EFA with various iterations, dropping items with high uniqueness and poor loading, yet loadings remained low and we could not identify an interpretable factor structure with suitable goodness-of-fit statistics.

DISCUSSION

This study aimed to assess patient-centered attitudes among medical students in West Africa. In most items in the “sharing” sub-scale, responses indicated attitudes aligned with a “provider-dominant” style of care versus a patient-centered one among the majority of students. In the “caring” sub-scale, the majority responded favorably toward patient-centeredness in some items, but toward more “disease-centered” or “low caring” attitudes in other items. In many items, patient-centered attitudes were more prevalent among students in higher academic years, but there were few differences by gender.

Attitudes favoring a more provider-dominated style of care, particularly in the 91% of students that agreed the patient must always be conscious that the doctor should lead the consultation, reveal a priority for future medical training in West Africa. Developing skills in sharing power can help providers increase patient trust and satisfaction, medication adherence, and efficiency in consultations [4,8]. Further, a prior study among HIV patients in Mali suggests an unmet demand for shared power. In response to vignettes of patient-provider interactions, 40% of participants preferred “shared power” over a provider-dominant style (36%) or no preference (24%). [37]. Those patients who expressed preference for “shared power” versus “provider-dominant” were also more likely to give low ratings of the quality of patient-provider

communication at their care facility, suggesting disconnect between their preferred style and the style they experience.

Responses toward caring items also reveal target areas for training. For instance, students generally acknowledged the importance of the relationship with the patient and even the use of humor, but less than half agreed that a treatment plan must be concordant with a patient's way of life in order to succeed. In our previous qualitative work, patients in Bamako appreciated friendliness and generally regarded their providers as friendly. However, they reported that providers did not often seek to understand and address their individual issues underlying poor medication adherence or missed appointments [38]. Curricula that enhance skills in eliciting and supporting lifestyle and psychosocial influents on patient health may prepare future providers to better address issues like adherence.

Unlike previous studies, we found no evidence of lower patient-centeredness in students of higher academic year. For some items, there appeared to be general trends toward higher patient-centeredness with higher academic years. It is possible that there is a positive effect of training on patient-centered orientation, as students in advanced years are likely to have had extended clinical experiences similar to the longitudinal integrated clerkships, which are replacing short-term rotations in some high-income settings due to their positive impact on developing patient-centeredness in students [39]. However, our findings could be explained by selection bias: Typically, only one-fifth of first year students pass the exam permitting them to continue to subsequent training, resulting in a more selective student body in later academic years. While this exam tests clinical knowledge and not patient-centered attitudes or skills, it may be that students with more academic ability or commitment are also those who hold more patient-centered attitudes in items where this trend was observed. Selection bias could have also occurred in sampling, as 5th/6th year students were sampled through social networks, and only 1st and 3rd year students who attended class on the day of the survey were included.

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According to the original PPOS scoring, our sample of Malian medical students was moderately oriented toward the caring aspect of patient-centeredness and slightly less orientated toward the sharing aspect. Compared to previous studies, mean PPOS score (3.38) was higher (more patient-centered) than the mean reported among South African medical students (2.24-2.65), comparable to students in Pakistan (3.40) and Greece (3.81-3.96) but lower than students in U.S (4.57) and Brazil (4.66)[17,18,21,25,40]. However, scores from our study and the others we cite should be interpreted with caution, as internal consistency and construct validity measures were either inadequate or not reported in the publications.

Our internal consistency measures and factor analyses raise concerns about applying the PPOS outside of the high-income setting where it was developed. Among the many studies that have applied the PPOS in an international context, we only identified two that attempted to assess the structure and construct validity of the scale. In the previously cited South African study, Archer and colleagues reported poor internal consistency and no evidence of a latent factor structure in CFA or EFA [25]. Pereira and colleagues concluded that the Brazilian adaptation of PPOS had acceptable internal consistency among physicians and medical students, however, the Cronbach's alpha ($\alpha=0.605$, similar to our 0.580). fell below the commonly accepted standard of 0.70 as an indication of adequate internal consistency [41]. Similar to our findings, the factors extracted in the EFA conducted by Pereira and colleagues did not correspond with the original "caring" and "sharing" dimensions, and the fit statistics of the CFA were borderline acceptable.

The differences in structure and measurement properties we observed with the PPOS may be due to limitations of the measure itself or to differences in the way that the patient-provider relationship is conceptualized in this West African context. When examined against our qualitative findings, many of the original PPOS items did not directly reflect the values and experiences patients had expressed [38]. Notably, the PPOS contains a number of items about the patient's access to information, which rarely entered discussions with our patient participants in Bamako.

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3 The concept of patient-centeredness may vary in different cultural settings [42] and might
4 ultimately be best defined by the patients themselves [43]. For future research aiming to measure
5 patient-centeredness as a unified construct in sub-Saharan Africa, we recommend developing and
6 validating contextually-relevant scales based on careful selection of appropriate items from existing
7 measures as well as new items derived through formative research. Barry and colleagues applied
8 this method to develop a scale assessing the patient-provider relationship in prevention of mother-
9 to-child transmission facilities in South Africa; that scale demonstrated high internal consistency
10 and strong factor loadings [44].
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20 Our findings should be considered in light of the following limitations. First, our cross-
21 sectional data limits us from drawing any conclusions about the causal effect of medical training on
22 attitudes. Secondly, a large proportion of students were not present on campus during survey
23 administration and surveys were distributed through social networks for 5th and 6th year students.
24 These factors may have resulted in selection bias (students with more positive attitudes may have
25 been more likely to be selected). The more informal social network distribution limited us from
26 calculating a valid overall response rate. A further limitation is that even after multiple rounds of
27 pretesting, it is possible that some questions may not have been interpreted as intended by all
28 participants. A more systematic approach to the translation of items, like the Delphi method applied
29 by Pereira and colleagues [45], may have helped improve the translation quality. Additionally,
30 though we conducted this study at one of the major medical training facilities in West Africa, the
31 fact it was conducted at only one institution may limit generalizability of findings. Finally, the PPOS
32 measures attitudes, which do not always translate into the provider behaviors that relate to better
33 care outcomes. While attitudes and orientation are important, measuring specific communication
34 skills in providers (as well as their effect on patient outcomes) should be incorporated into
35 educational efforts that aim to promote better patient-provider relationships [22].
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As sub-Saharan Africa faces the increasingly multifaceted public health challenges of the 21st century, the need for effective patient-provider relationships becomes more critical than ever. Our findings suggest that more work is needed to ensure that medical students in West Africa develop and sustain positive attitudes toward patient-centered care. It is time for a concerted effort among medical schools to pilot and implement curricula that fosters a patient-centered orientation. Our findings—in the context of the patient literature from the region—suggest focus on developing effective skills and favorable attitudes toward power-sharing and addressing lifestyle factors. The movement toward patient-centered care, however, cannot be successful with curricula changes alone. First, as our study reveals, evaluation of any effort to increase patient-centered attitudes and practice will, require improved measurement tools based on terminology, concepts and clinical experiences relevant to local settings. Secondly, systemic changes in both local health systems and the international public health environment are needed to ensure that patient-centeredness is fully valued, enabled and supported [16]. These efforts may include transforming supervision mechanisms to model shared power (versus reinforce authoritarianism,) incentivizing and supporting providers to live in and build long-term relationships with hard-to-reach communities, and fully shifting vertical disease-control programs into integrated primary care systems that measure and reward patient-centered outcomes [16]. These multi-level changes could create an enabling environment that helps to raise the sub-optimal attitudes we observed among students, put patient-centered care into practice, and yield enormous benefits to patients in sub-Saharan Africa.

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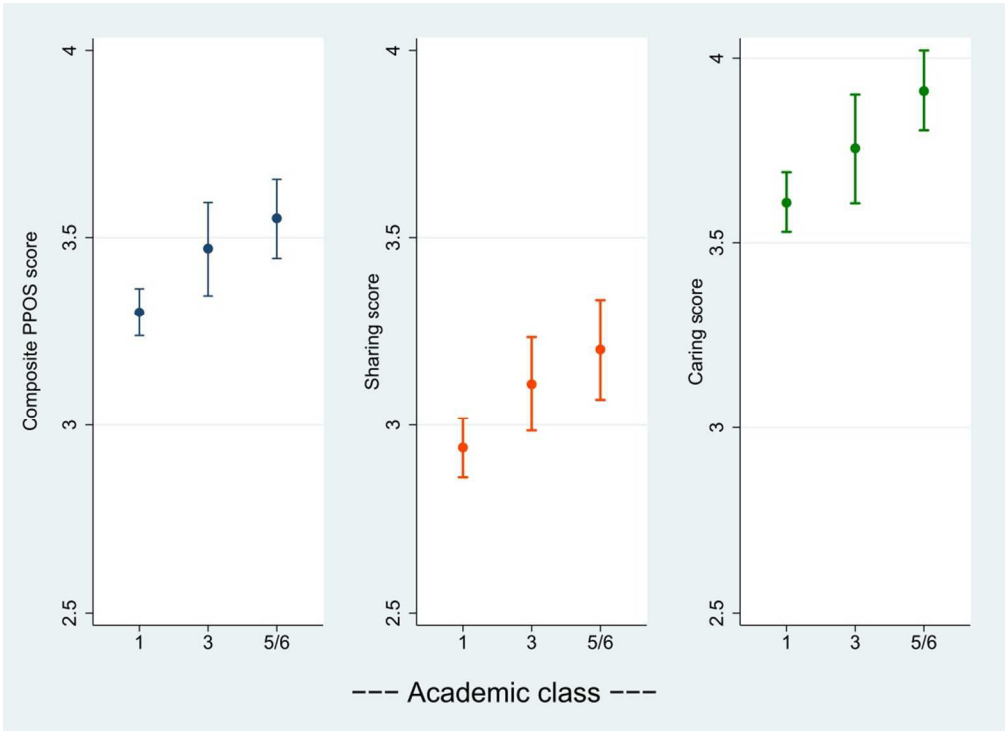
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Figure Captions

Figure 1: Mean scores with 95% confidence intervals of the full Patient-Practitioner Orientation Scale and sub-scales in a sample of 1st, 3rd, and 5th/6th year medical students in Bamako, Mali (n=430)

Figure 2. Confirmatory factor analysis of the Patient-Practitioner Orientation Scale in a sample of Malian medical students (n=430)

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Caption : Figure 1: Mean scores with 95% confidence intervals of the full Patient-Practitioner Orientation Scale and sub-scales in a sample of 1st, 3rd, and 5th/6th year medical students in Bamako, Mali (n=430)

98x71mm (300 x 300 DPI)

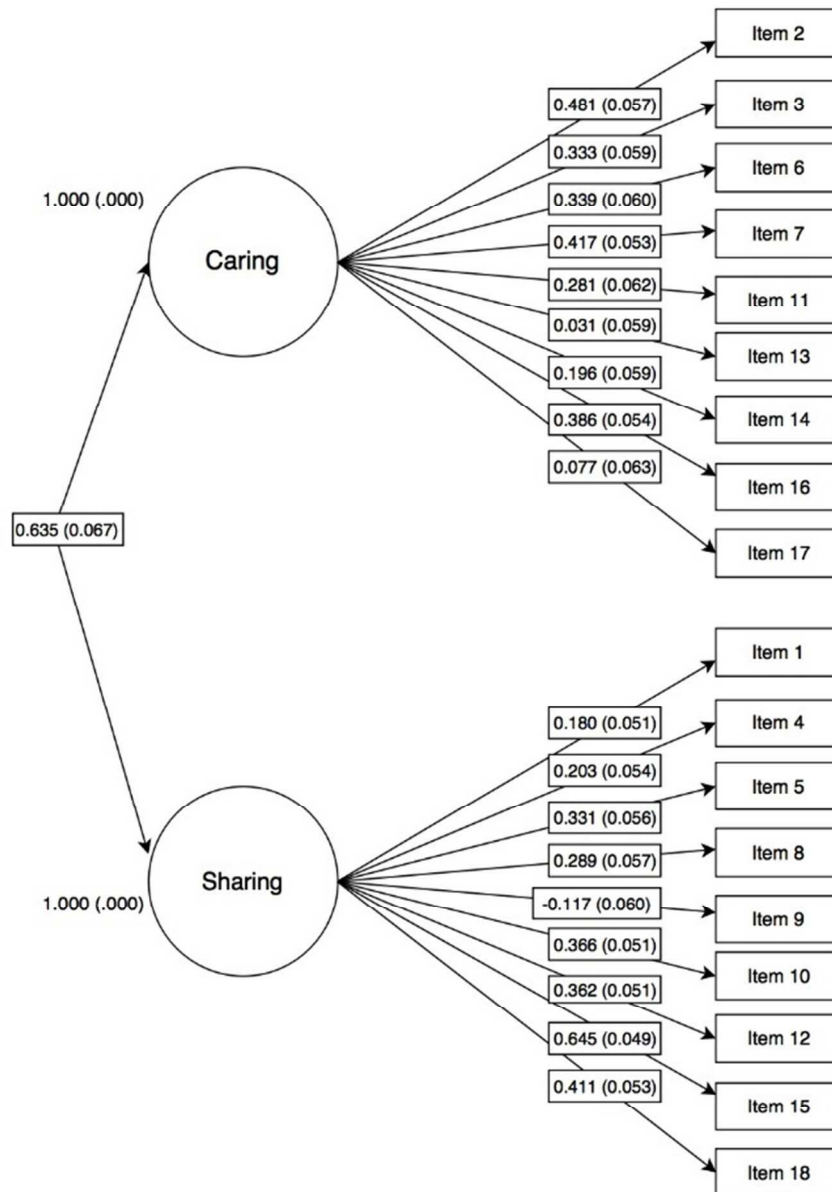


Figure 2. Confirmatory factor analysis of the Patient-Practitioner Orientation Scale in a sample of Malian medical students (n=430)

64x77mm (300 x 300 DPI)

STROBE Statement—checklist of items that should be included in reports of observational studies

| | Item No | Recommendation | Reference in Manuscript |
|------------------------------|---------|--|-------------------------|
| Title and abstract | 1 | (a) Indicate the study’s design with a commonly used term in the title or the abstract | Page 2 |
| | | (b) Provide in the abstract an informative and balanced summary of what was done and what was found | Page 2 |
| Introduction | | | |
| Background/rationale | 2 | Explain the scientific background and rationale for the investigation being reported | Pages 5-7 |
| Objectives | 3 | State specific objectives, including any prespecified hypotheses | Page 7 |
| Methods | | | |
| Study design | 4 | Present key elements of study design early in the paper | Page 7-8 |
| Setting | 5 | Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection | Page 7 |
| Participants | 6 | (a) Cohort study—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up Case-control study—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls Cross-sectional study—Give the eligibility criteria, and the sources and methods of selection of participants | Page 9 |
| | | (b) Cohort study—For matched studies, give matching criteria and number of exposed and unexposed Case-control study—For matched studies, give matching criteria and the number of controls per case | N/A |
| Variables | 7 | Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable | Page 8 |
| Data sources/ measurement | 8* | For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group | Page 8 |
| Bias | 9 | Describe any efforts to address potential sources of bias | Page 8-9 |
| Study size | 10 | Explain how the study size was arrived at | Page 9 |
| Quantitative variables | 11 | Explain how quantitative variables were handled in the analyses. If applicable, describe which | Page 9-10 |

| | | | |
|---------------------|----|--|--------------------------|
| | | groupings were chosen and why | |
| Statistical methods | 12 | (a) Describe all statistical methods, including those used to control for confounding | Page 8-9 |
| | | (b) Describe any methods used to examine subgroups and interactions | Page 9 |
| | | (c) Explain how missing data were addressed | Page 9, Page 10, Page 11 |
| | | (d) <i>Cohort study</i> —If applicable, explain how loss to follow-up was addressed | N/A |
| | | <i>Case-control study</i> —If applicable, explain how matching of cases and controls was addressed | |
| | | <i>Cross-sectional study</i> —If applicable, describe analytical methods taking account of sampling strategy | |
| | | (e) Describe any sensitivity analyses | N/A |

Continued on next page

Results

| | | | |
|-------------------|-----|--|---------------------|
| Participants | 13* | (a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed | Page 11 |
| | | (b) Give reasons for non-participation at each stage | N/A |
| | | (c) Consider use of a flow diagram | N/A |
| Descriptive data | 14* | (a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders | Page 11-12, Table 1 |
| | | (b) Indicate number of participants with missing data for each variable of interest | Table 1 |
| | | (c) Cohort study—Summarise follow-up time (eg, average and total amount) | N/A |
| Outcome data | 15* | Cohort study—Report numbers of outcome events or summary measures over time | N/A |
| | | Case-control study—Report numbers in each exposure category, or summary measures of exposure | N/A |
| | | Cross-sectional study—Report numbers of outcome events or summary measures | Page 12-14, Table 2 |
| Main results | 16 | (a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included | Page 12-14, Table 2 |
| | | (b) Report category boundaries when continuous variables were categorized | N/A |
| | | (c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period | N/A |
| Other analyses | 17 | Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses | Page 12-15, Table 2 |
| Discussion | | | |
| Key results | 18 | Summarise key results with reference to study objectives | Page 15 |
| Limitations | 19 | Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias | Page 18-19 |
| Interpretation | 20 | Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence | Page 18-19 |
| Generalisability | 21 | Discuss the generalisability (external validity) of the study results | Page 19 |
| Other information | | | |
| Funding | 22 | Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based | Page 20 |

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at www.strobe-statement.org.

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